

WHAT IS CLAIMED IS:

1. For use in a subterranean well completion having a wellbore through which a lower section of a tubing structure extends
5 downwardly from a well structure engaging the tubular structure and defining a substantial outward acoustic energy dissipation path at the juncture between the lower tubing structure and an upper tubing structure section disposed above the well structure, a well operation method comprising the steps of:
10 acoustically transmitting a downhole well parameter signal upwardly through the lower tubing structure section toward the well structure;
 converting the acoustically transmitted signal to a non-acoustic signal at a tubing structure location below the well structure; and
15 transmitting the converted signal upwardly past the well structure along a signal path leading to a signal receiving location.

2. The method of Claim 1 wherein:
the acoustically transmitting step includes the steps of:
20 connecting a first downhole transceiver structure to the lower tubing structure section,
 connecting a second downhole transceiver structure to the lower tubing structure section between the well structure and the first downhole transceiver structure, the second downhole
25 transceiver structure having a transceiver portion and a signal converter portion, and
 transmitting acoustic signals from the first downhole transceiver structure through the lower tubing structure section to

the transceiver portion of the second downhole transceiver structure, and

the converting step is performed utilizing the signal converter portion of the second downhole transceiver structure.

5

3. The method of Claim 1 wherein:

the converting step is performed by converting the acoustically transmitted signal to an electrical signal.

10

4. The method of Claim 3 wherein:

the converting step is performed by converting the acoustically transmitted signal to a digital electric signal.

5. The method of Claim 3 wherein:

15

the converting step is performed by converting the acoustically transmitted signal to an analog electrical signal.

6. The method of Claim 3 wherein:

20

the converting step is performed by converting the acoustically transmitted signal to an electromagnetic wave signal.

7. The method of Claim 3 wherein:

the converting step is performed by converting the acoustically transmitted signal to a photoelectric signal.

25

8. The method of Claim 1 wherein:

the step of transmitting the converted signal is performed by routing the converted signal upwardly through the well structure.

9. The method of Claim 8 wherein:

the routing step includes the step of extending a signal cable structure upwardly through the well structure.

5

10. The method of Claim 9 wherein:

the well structure is a hanger structure.

11. The method of Claim 1 wherein:

10 the step of transmitting the converted signal is performed by routing the converted signal upwardly around the well structure.

12. The method of Claim 2 further comprising the step of:

15 transmitting a control signal downwardly through the signal path to the first downhole transceiver structure.

13. The method of Claim 12 wherein:

the downhole well parameter signal is associated with a predetermined downhole well parameter, and

20 the method further comprises the step of utilizing the control signal to change the predetermined downhole well parameter.

14. The method of Claim 12 further comprising the step of:

25 utilizing the control signal to change the parameter value range associated with the downhole well parameter signal.

- 18 -

15. The method of Claim 12 further comprising the step of:
utilizing the control signal to change the transmission
frequency of the first downhole transceiver structure.

5 16. The method of Claim 12 further comprising the step of:
utilizing the control signal to change the type of data
transmitted by the first downhole transceiver structure.

10 17. The method of Claim 2 wherein:
the step of transmitting acoustic signals from the first
downhole transceiver through the lower tubing structure section to
the transceiver portion of the second downhole transceiver is
performed utilizing at least one signal repeater carried by the lower
tubing structure section between the first and second transceiver
15 structures.

18. A subterranean well completion comprising:

a wellbore extending into the earth;

a tubular structure extending into the wellbore;

an acoustic energy dissipating well structure engaging the

5 tubular structure, with an upper portion of the tubular structure extending upwardly from the well structure, and a lower portion of the tubing structure extending downwardly from the well structure and through the wellbore; and

a signal transmission system including:

10 signal transmission apparatus operable to transmit an acoustic signal upwardly through the lower tubing structure section toward the well structure from a downhole location, convert the acoustic signal to a non-acoustic signal at a location on the lower tubing structure section below the well structure, and transmit the
15 converted, non-acoustic signal from an output section of the signal transmission apparatus, and

a signal path structure coupled between the output section and a signal receiving location disposed above the well structure.

20

19. The subterranean well completion of Claim 18 wherein:

the acoustic energy dissipating well structure is a hanger structure.

25

20. The subterranean well completion of Claim 19 wherein:

the well completion is a subsea well completion, and
the hanger structure is a fluted hanger structure.

21. The subterranean well completion of Claim 19 wherein:
the well completion is a surface-based well completion, and
the hanger structure is a slip structure.

5 22. The subterranean well completion of Claim 18 wherein:
the signal transmission apparatus includes upper and lower
longitudinally spaced transceiver structures carried by the lower
tubing structure section.

10 23. The subterranean well completion of Claim 22 wherein:
the upper transceiver structure includes a signal converting
portion operable to output the converted, non-acoustic signal to the
signal path structure.

15 24. The subterranean well completion of Claim 22 wherein:
the acoustic signal is generated by the lower transceiver
structure and is indicative of a predetermined sensed well
parameter.

20 25. The subterranean well completion of Claim 24 wherein:
the signal transmission system, via the signal path structure, is
further operative to transmit a control signal downwardly through
the lower tubing structure section.

25 26. The subterranean well completion of Claim 25 wherein:
the signal transmission system is further operable to utilize the
control signal to change the predetermined sensed downhole well
parameter.

27. The subterranean well completion of Claim 25 wherein:
the signal transmission system is further operable to utilize the
control signal to change the parameter value range associated with
5 the downhole well parameter.

28. The subterranean well completion of Claim 25 wherein:
the signal transmission system is further operable to utilize the
control signal to change the type of data transmitted by the lower
10 transceiver structure.

29. The subterranean well completion of Claim 22 further
comprising:
at least one signal repeater carried by the lower tubing
15 structure section between the upper and lower transceiver
structures.

30. The subterranean well completion of Claim 18 wherein:
the signal transmission system is operable to convert the
20 acoustic signal to an electrical signal.

31. The subterranean well completion of Claim 30 wherein:
the signal transmission system is operable to convert the
acoustic signal to a digital electric signal.

25

32. The subterranean well completion of Claim 30 wherein:
the signal transmission system is operable to convert the
acoustic signal to an analog electrical signal.

33. The subterranean well completion of Claim 18 wherein:
the signal transmission system is operable to convert the
acoustic signal to an electromagnetic wave signal.

5

34. The subterranean well completion of Claim 18 wherein:
the signal transmission system is operable to convert the
acoustic signal to a photoelectric signal.

10

35. The subterranean well completion of Claim 18 wherein:
the signal path structure extends through the well structure.

15

36. The subterranean well completion of Claim 18 wherein:
the signal path structure includes a signal cable structure
extending through the well structure.

20

37. The subterranean well completion of Claim 18 wherein:
the signal path structure includes a signal cable structure
extending upwardly along the upper tubing structure portion.

25

38. The subterranean well completion of Claim 37 wherein:
the subterranean well completion is a subsea well completion
having a test tree structure connected in the upper tubing structure
section, and the signal cable structure extends externally around the
test tree structure.

39. The subterranean well completion of Claim 37 wherein:

the subterranean well completion further comprises an electrohydraulic module connected in the upper tubing structure section, and

5 the signal cable structure extends interiorly through the electrohydraulic module.

40. The subterranean well completion of Claim 37 wherein:

the subterranean well completion further comprises an electrohydraulic module connected in the upper tubing structure section, and

the signal cable structure extends exteriorly around the electrohydraulic module.

15 41. The subterranean well completion of Claim 37 wherein:

the well structure is a hanger structure, and

the signal cable structure extends upwardly through a wall portion of the tubing structure at the hanger structure location.

20 42. the subterranean well completion of Claim 41 wherein:

the wall portion is a wall portion of a ported slick joint extending through the hanger structure.

43. The subterranean well completion of Claim 18 wherein:

the well completion is a subsea well completion,

the signal transmission system is operable to convert the
acoustic signal to an electromagnetic wave signal which is
5 transmitted into and through an adjacent portion of the earth, and

the signal path structure includes the adjacent earth portion, a
transmitter structure positioned adjacent the sea bed and operable
to receive the electromagnetic wave signal, and a signal output cable
extending from the transceiver to the signal receiving location.

10

44. The subterranean well bore completion of Claim 22
wherein:

the upper transceiver structure has a generally tubular
configuration, is connected in-line with the lower tubing structure
15 section, and has an axial bore with a diameter substantially identical
to that of the interior diameter of the lower tubing structure
section.